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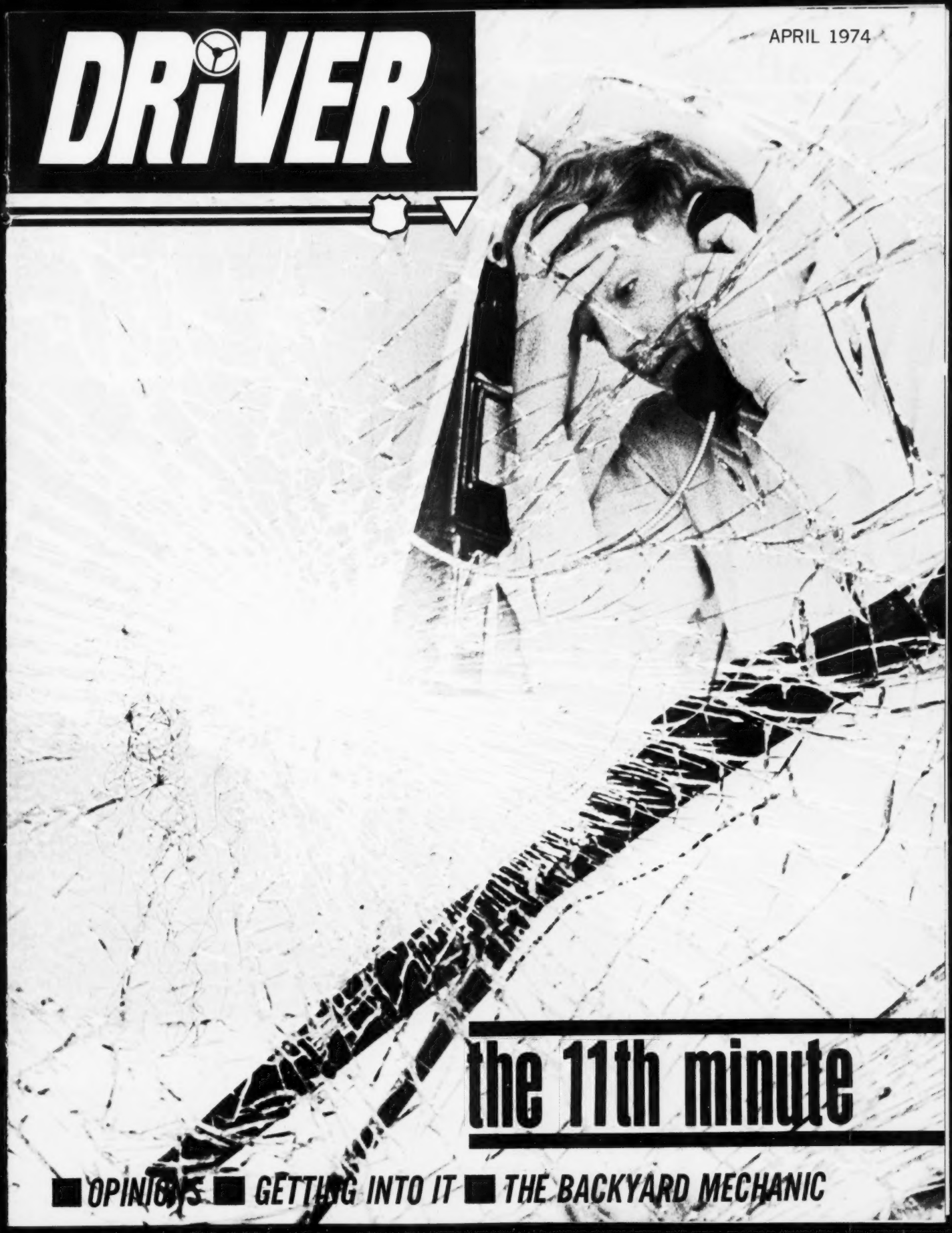
APRIL 1974



the 11th minute

■ OPINIONS ■ GETTING INTO IT ■ THE BACKYARD MECHANIC

DRIVER

THE ELEVENTH MINUTE

The first 10 minutes you can handle. But what do you do with the 11th?

by
Donn Binder

It's quitting time and you're in a hurry. You need to beat rush-hour traffic. You move through the crowd leaving the building and pass some people you know, but you don't stop. No time for small talk. You're in a hurry.

At the edge of the parking lot the crowd scatters. You walk faster, reach your car, and get it moving right away.

A few seconds later you're in line waiting to get out of the lot. There are four cars ahead of you. So you wait.

More seconds go by before a break in traffic comes. A couple of cars pull out, and now you're third. You move up, and wait again.

It seems like forever before an-

other car gets out and you pull up to second. You look at your watch and it's five minutes past quitting time. Traffic is starting to pick up. You wonder if you'll make it.

Suddenly there's an opening and the car in front lurches ahead, then jerks to a stop. He missed his chance And just when you're in a hurry.

It's almost seven minutes after before another break comes and the car ahead moves out. So now it's your turn. If you can get a quick shot, you can still beat the rush.

You luck-out. Your break comes and you whip out into fast-moving traffic. You drive on for a couple of miles twisting in and out of traffic, getting ahead, one car at a time. By the time you start watching for your turn, it's nearly ten minutes after. You're making good time.

You see your turn coming up on the right, so you flick your signal and glance at the rear-view mirror. The car behind is too close. You move your foot to the brakes and step down just enough to flash your brake lights.

Your turn gets closer and you step down a little more to really start slowing. You glance at the mirror again. The car behind is still a little too close, but you've got his eye. So you step down on the brakes hard and crank into a hard right turn.

You come out quickly and glance back once more. The car that was tailgating you streaks out of your mirror. He must be in a hurry, too.

Just then something on the right catches your eye. You look ahead and see a station wagon backing into the street.

Your stomach sinks as you mash the brakes and twist the wheel hard left. You feel helpless as your car sinks into the side of the wagon. Glass shatters as your hood folds up and flies open.

Your shoulders bounce back against the seat. Everything stops. Suddenly it's quiet. Then a hissing sound begins. Steam fills the air. You feel sick.

continued

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THE EDITOR SPEAKS

DOUBLE CLUTCH

Does Anyone Know A Good Mechanic

Ever get that sinking feeling in your stomach when you realize that you have to take your car to a mechanic for work? The more maintenance you perform yourself, the more it scares you to trust it to somebody else. How do you find a man who really knows his business and actually accomplishes what he charges you for?

Some communities, through a system of registration or licensing, are starting to keep a legal eye on the ticklish business of auto repairs. Under such systems, a garage turning out incompetent or fraudulent work would eventually have its business license taken away.

The car manufacturers are worried about the national shortage of qualified mechanics and are doing something about it. Last fall, Chrysler announced the opening of a car college called the MoTech Automotive Education Center. At five-week intervals, the student moves through training in power plants, chassis systems, body hardware, drive trains, electrical systems, air conditioning and heating and engine performance, fuel and emission systems. At the end of the year-long course, the graduate will be qualified to repair all domestic-built cars.

All of this seems to mean that eventually the problem of finding a reliable mechanic won't be as tough as it is now. In the meantime, if you need work done, ask for recommendations from people who have lived in the area a while, get a firm price before work begins, and keep an eye on the work in progress if you possibly can. If you're not sure what's wrong with the car, remember that a diagnostic center may be the place to start.

NEXT MONTH Pedaling Along

It's eleven minutes after. What do you do now?

What you do now is don't panic. Naturally you're up tight. Is anybody hurt? How bad is the damage? Dollar signs go flying past your eyes.

But stay cool; everything you do and say from this minute on is really important. Mistakes now can haunt you for a long, long time.

You may think this will never happen to you, but statistics show that one driver in every four will probably be involved in a crash sometime during the next four or five years.

And because that likelihood is so high, it makes good sense to know what to do when involved in an accident. Not only what you must do under the law, but also what to do to protect yourself from legal action resulting in excessive and unjust claims.

Here are some suggestions generally recommended by the experts. Although we've listed them in order of normal importance, this may vary from place to place. So if you have any questions about that, or concerning legality, we suggest you contact your local police agency for answers.

STOP

If you are driving a vehicle involved in an accident, you must stop immediately at or near the scene. Make your stop so that traffic is obstructed as little as possible.

Do not leave. You must stay put until you've identified yourself and assisted the injured. To leave before you do so could be interpreted as hit-and-run.

And speaking of hit-and-run, if the other driver doesn't stop, then note the vehicle type and color, and its license number. Also get a description of the driver and any distinguishing damage to his vehicle.

FAULT

Don't make any statements about responsibility for the accident. Don't argue, accuse, or sign any statements not required by the police.

AID

If anyone is hurt and needs prompt medical treatment, call for professional help. Make the injured as comfortable as possible. Render first aid if the person asks for it or if it's apparent that it's needed.

However, don't move an injured person—except to save him from fire or drowning—unless you know what you're doing. Your good intentions could injure him even more.

CONTROL

Do what you can to protect the scene from traffic. Station someone a safe distance from the accident, or put out warning devices like flares, reflectors, etc., to keep oncoming drivers from smashing into you.

POLICE

If anyone has been killed or injured, you must immediately notify the police who have jurisdiction, and summon an ambulance. (It's smart to do both at once.) If you must leave to do this, be sure to leave something behind that will identify you. This will protect you from a hit-and-run charge.

You must also notify the police immediately if you hit a traffic-control device, a highway appurtenance, or unattended property if you can't find its owner.

On the other hand, in some states you don't have to call the police immediately if damage to private property is $100 or less. Even so, a police report might be helpful if an excessive liability claim is made against you later.

INFORMATION

Normally, you'll need to exchange certain information with other drivers and the investigating officers. This will be used for accident reports and in court. You'll need information about:

- Other Drivers:
  - Name, address and phone number
  - Driver's license numbers, state and expiration date
  - Insurance company, policy number and date
- Other Vehicles:
  - Name, address and registration number
  - Description
  - License tag number and state
  - Time, date and location, if struck unattended
  - Approximate location and amount of damage
  - Names, addresses and telephone numbers of occupants

continued

continued
THE ELEVENTH MINUTE

ACCIDENT check list

If you are involved in an automobile accident or bump into a pedestrian:

- Call an ambulance for anyone seriously injured.
- Call or have someone call the nearest law enforcement agency.
- If either automobile is blocking traffic or constitutes a hazard to other traffic, take whatever action you can to warn other traffic (red lights, flares, flags, or station someone to flag down cars).
- Write down the license number of the other car along with the driver's name and address and the name and address of all persons in the other car.
- Be sure to obtain names and addresses of other witnesses.
- Make a diagram of the accident scene.
- Measure any skid marks made by either vehicle.
- Do not admit any responsibility nor sign any statement except for the claim representative of your insurance company.
- Do not disclose the amount for which you are insured.
- File any reports of accident required by state or local laws.
- Notify your insurance company, even if you think the incident is minor. If you do not notify your insurer and a legal action develops at a later date, your insurance company could decline liability for your defense.

- The Injured:
  - Name, address and telephone number
  - Where taken for treatment
  - Time ambulance called
  - Time ambulance arrived
  - Name of ambulance company
- Accident Location:
  - Date, day, time and place of crash
  - Weather and highway conditions
  - Where accident happened
  - Diagram showing the highway, and intersection, position of vehicles before and after the accident and traffic-control devices
  - Description of anything else involved, such as animals or property
  - Description of what happened including contributing circumstances
  - If you have a camera, photograph the vehicles and scene of the accident. But do not photograph the injured.*
- Witnesses:
  - Names, addresses, phone numbers and comments. (If possible, get signed statements.)
- Investigating Police:
  - Names, badge numbers, department, city and state

**Photographs of injured persons are often misleading. They tend to make injuries look more serious than they really are, which can be to your disadvantage in court.*

Investigation case number

Considering that any accident, even a minor one, is a sudden, traumatic experience, and that you and others will probably be suffering from shock, panic or at least nervous excitement, it's possible that you won't get all this detailed information at the scene.

But at least be sure to get the names, addresses and telephone numbers of everyone involved. Witnesses are particularly important. If they were not directly involved, or were merely bystanders, you may have no way to find them once they leave the accident scene.

In his booklet, "Self-Protection Accident Report," Police Officer Richard O. Ward, an expert witness who has been investigating and testifying in accident cases for over 16 years, suggests that it's to your advantage to answer the following questions while still at the scene. Your answers may be of major importance later.

1. Exactly where were you when you first saw the car or whatever was involved?

2. What were you doing at the moment you first saw the other car or whatever was involved?

a. Your movement, i.e., speed, direction, slowing down or speeding up?

b. Your attention, i.e., where had you been looking? Had you been talking to anyone? Lighting a cigarette, etc.?

3. Where were you when you first realized you were in danger?

5. Exactly what did you do to avoid the accident?

6. What preventive action was made by the other vehicle, if any?

7. Exactly where did the collision take place? (Determine the point of impact by a fixed landmark, e.g., any pole, building, billboard, bridge, road marker, etc., and pace off the distance.)

8. Where did you stop after the collision?

9. What is the first thing you remember after the accident?

10. If you were unconscious, even for a moment, what is the last thing you clearly remember before the accident?

11. Who did you first see after the accident?

12. What did you say to him?

13. What did he say to you?

REPORTS

Most states and insurance companies require that an accident report be filed within a specified time; usually 14 hours to 10 days. If you have any questions about how to go about this, contact the police who have jurisdiction where the accident happened, or your insurance company, if appropriate, right away.

Finally, if you were not the owner of the vehicle you were driving, then give the owner the full facts, too—right away.

Now, think back to that rush-hour accident at the beginning of this article. Did you think you, as the driver, were primarily at fault because you were in a hurry?

Well, if you let your imagination go through these post-accident suggestions, you may find that although you might have been ready to take all or a good part of the blame, you weren't as guilty as you first thought.

Of course, it's better not to have accidents. It's better to work hard at driving and not become a statistic. But if the numbers game catches up with you—you don't have to cause an accident to be involved in one—know what to do. You must meet your legal and moral responsibilities. But you also should do what is necessary to protect yourself from excessive and unjust claims.

In the meantime, drive safely—and watch out for that eleventh minute.

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OPIN

1A. What do you think about the 55 miles per hour highway speed limit?

SSgt. Cox

It's a hassle for me. I'm driving a Datsun 2000, and because it doesn't work in top gear at 55, I have to change the rear end on my car. At 55 miles per hour, I get 24 miles to the gallon; at 65, I get 26. So, I lose two miles to the gallon. But for most cars, driving 55 will save quite a bit of fuel.

Amn. Kiggins

Well, for myself, it really doesn't bother me, because my husband and I don't do all that much driving. The speed limit between work and home is 40 miles an hour, and we don't drive the highways much. I'm used to driving slow, anyway.

1B. Are you aware that the highway death toll has dropped significantly since it went into effect?

For one thing there are fewer cars on the road right now. Also, people are thinking about 55, so they're being more careful. The slower the speed, the less energy to dissipate in any accident, so the better the chance to survive. But as a practical thing, wouldn't it be better to train more drivers how to drive carefully and increase their chances for survival?

I'm sure it has. The slower you go, the easier it is to stop in case of any kind of an emergency. And, chances of an accident are a lot slimmer.

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IONS

Editor's note: As the saying goes, there's a first time for everything. This is the first time DRIVER has solicited the opinions of a married couple for our OPINIONS feature. Lieutenant Scott Weeker and Airman First Class Sarah Weeker are newlyweds. Both are in the Air Force and are stationed at Norton AFB, California. They drive separate cars, and, as you will notice, they definitely have separate OPINIONS about driving.

SSgt. Fletcher

As far as 55 miles an hour goes—I don't like to drive that slow. But if it saves gas, and the way the price of gas is today, then I don't mind. I'm driving a '70 Olds, and I'd say I'm getting about 14 miles to the gallon.

I've heard about it. The lower speed limit should help, but you're still going to have people getting drunk and falling asleep.

Amn. Weeker

I think it's a very necessary step toward conserving fuel. I used to be a two-or-three-mile-per-hour-over-the-speed-limit speedster. Now I find that I can stay at 55 along with everyone else.

Yes. In my job, we receive public news releases from the Highway Patrol, and it's a fact that there are far fewer fatal and serious accidents at 55 miles an hour than at 65 or 70. I remember in defensive driving courses they demonstrated what a difference of 10 miles an hour could mean upon impact. For instance, at 30 miles an hour, if you ran into a tree, you might crush the front end of your car; but at 40 miles an hour, you'd probably *kill* yourself.

Lt. Weeker

In California, it's a bummer. When you're driving six or eight lane monsters, it's very boring. Saving gas and all things considered, I suppose it's all right, but I think I get a little upset with it. From the energy standpoint, I consider it perhaps a necessity, but not a very happy one.

I'm not too surprised, and I'm happy about it. Wasting people's lives on the highways is probably the most ridiculous, the most criminal thing our mechanized society can do. If the number of highway deaths has dropped, is it the 55 mile speed limit that's done it, or is it fewer people driving?

continued

2. When you drive, do you ever think about the possibility or consequences of an accident?

SSgt. Cox

I think about the possibility of an accident about every time I get tied up in traffic. You see, I'm an ex-motorocycle driver, so I usually have an escape route already planned out. That's how I got three years and around 100,000 miles on a motorcycle with only one accident.

Amn. Kiggins

Always. I always do. Maybe I'm a little bit too cautious. I don't know. My mother's like that. I drive defensively and I don't think that you can get *too* defensive.

3. What do you think about seat belts? Do you wear them?

Every time. Without fail! And so does my wife. She's been in two accidents, and both times the seat belt has saved her from bad injuries. It's been demonstrated so many times that your survivability is much improved. And when you drive a sports car, if you don't have a seat belt on, your ability to control it suffers. I feel a lot more secure when wearing one.

I've always used my seat belt. You know, you hear about a friend of yours or someone's friend that wasn't wearing their seat belt, and—it's just terrible. I've always worn mine.

4. What comments do you have about the push to require more safely constructed cars?

Well, I can trim out most of my feelings and say I think it's sort of ridiculous. You can get cars only so safe, but if you don't train the drivers you've wasted all your time, effort, and money. I believe in training people to respond properly so they won't just mash the brake everytime something goes wrong. And I think a lot of injuries and accidents could be prevented that way.

I think it's wonderful. Really! The thing with the springy bumpers is good—if you're going at a slower speed. But these new seat belts, where you have to be strapped in before you can start the car . . . Well, people who don't want to wear seat belts will disconnect the buzzer, hot wire the car, or something, just so they won't have to wear their seat belt. They're so determined, they'll find a way.

SSgt. Fletcher

All the time I'm driving. I feel like I drive carefully enough so that I can look far enough ahead to avoid an accident. I've been driving for 11 years, and I've never had an accident.

I have 'em, but I don't use 'em. I never got in the habit. If I want to get in the glove compartment or something while I'm driving, and I go to lean over with my seat belt on, it pulls me back. I wind up taking it off anyway, and I just never bother putting it back on.

It's a good idea. The one I like best is the one with the bag—the air bag. And it would be nice if they'd put automatic dimmers on all the cars. A lot of people won't dim their lights for you.

Amn. Weeker

No. Not ordinarily. The possibility of an accident does come to mind when I see a hazard developing in front of me. I try to follow all the rules of driving that they teach you in Driver Education, such as aim high in steering, check the rear-view mirrors frequently, and, I think the biggest thing, always leaving myself an *out*.

I think seat belts are a marvelous invention. I wear them all the time. So does my husband. I find that in wearing them I can drive more comfortably, and I'm more relaxed at the end of a long drive. Some people think that in an accident seat belts would trap them. That's not true; they're going to keep you from being knocked unconscious, so when the car does come to a rest after an accident, you can undo your seat belt and get out.

I think *someone* should be pushing for more safely-constructed cars. I was fascinated by the development of the air bag that'll expand on impact and cushion you from going through the windshield, or into the dash or steering wheel. Another interesting thing is the increase in all the little lights that tell you when something is wrong with your car. People like me, who don't know the mechanical workings of the car, appreciate knowing, for instance, when the brakes need to be checked. You know, I'd like that.

Lt. Weeker

Oh, yes! I drive a Spitfire and they aren't known for their ability to withstand accidents—more for their ability to avoid them. I always drive defensively. I'm concerned about not only the physical loss but also the monetary considerations—like insurance rates, or hurting somebody else and being sued forever. It's a good way to ruin your life. You could be paying, not only with guilt, but through your pocketbook.

I use them all the time. I was in a serious accident once. A friend of mine was driving, and thank goodness it was a big Chrysler. I did have my seat belt on. There was 3,000 dollars damage just to the front end, so you know it was a bad one. When I think about how easy it would have been to go through the windshield. . . .

A society that's geared to rapid transportation using cars ought to be much more concerned about how safe they are. I think people are very apathetic about how many get killed on the highway. When they raise car prices to pay for the safety changes, a lot of people don't trust the price hikes. They don't see that the safety equipment is geared toward their survival.

continued

5. What bugs you most about other drivers?

SSgt. Cox

Stop sign runners and people who don't signal a lane change. These types of things can cause a lot of trouble.

Amn. Kiggins

Some just go a little bit *too* slow. And it's not just the older people. That's sometimes more aggravating than someone going really fast, because you tend to want to pass.

Oh, and motorcycles weaving in and out between cars. I see this all the time, and I'm scared to death because I'm afraid they're going to pull right in front of me.

6. Insurance companies charge higher rates for younger drivers in the high-risk age group. What comments do you have on this?

Well, I can't really bad-mouth it because the accident rates in these groups are higher. The only thing that I could say is I wish they would give a careful, young driver a better break. The few careless ones who up the rates can negate the benefits of the other 60 percent or more that are decent drivers.

Well, I think it's discrimination. It shouldn't go by age. It should be by your record—accidents, tickets, that sort of thing. Not just because you're under 25, or because you're a boy, or a girl, or you're not married, or other factors of this sort.

7. Other comments?

As far as I'm concerned, a program like the Air Force has is about the best approach. You take people and you make them undergo some form of training. And then, at least periodically, you *review* that training. Without some kind of review, even a good driver starts getting sloppy after a year or so, just from sheer boredom if nothing else. Before long, you can easily lose your edge or maybe get over-confident.

As for men and women drivers . . . I don't think there's any difference between men and women drivers. As a matter of fact, when I was eighteen I used to race cars—drag race. I never got hurt. I drove as good as any of them. And I think any woman can.

SSgt. Fletcher

People who're not paying attention to what they're doing. Also tailgaters, and people opening car doors when you're going down a narrow street, or somebody walking out between parked cars. You gotta be extra alert—keep your eyes moving.

Amn. Weeker

Drivers who consciously and willfully disobey traffic regulations. The reason we have traffic laws is to keep us all from smashing up out there. Now when someone purposely disobeys one of those laws, he could cause a smash-up and not even involve himself. Another thing that gripes me—people who think they're being extremely cautious and good drivers, but in fact are overly cautious and are therefore road hazards.

Lt. Weeker

Inconsideration. People who cause dangerous situations just out of pure inconsideration or immaturity. Like the guy who gets in the left-hand lane and says, "The hell with everybody else. I'm not gonna let anybody pass me. I'm goin' the speed limit, or close to it, so why should I move over?" That kind of bullheadedness is not only inconsiderate, it's dangerous; it causes other drivers to do strange things, too. Tailgating bugs me, also. Like in my little car—the thing that really scares me is to see that big car or truck coming up fast behind me. That bothers me.

Well, I think that there's ten per cent of the young drivers who're getting in all the trouble and are making the insurance companies go hard on all the rest of the young guys. Driving school training helps. I had six hours on the road and 30 hours of classroom, and I guess that subconsciously it stayed in the back of my mind. So, driver's training does help out a lot.

I think that if a young man or woman, because of accidents or speeding citations, is charged higher rates, he should be paying those higher rates because he is a bigger risk. But if a young driver proves, through taking driver education and perhaps defensive driving courses, and not having accidents or traffic citations, that he *is* a good and trustworthy driver, then I don't believe the insurance companies should charge him those high rates.

Insurance companies are in business. And they don't make money if people have accidents. So, in their rates there's a gamble kind of thing. Statistically, young people do have worse driving records and more accidents.

I just wish that a lot more people were aware of being considerate when they're driving. If everybody drove like they wanted other people to drive, everything would be all right.

I want to comment on pollution and how we, the mobile American society, have become accustomed to driving everywhere we go. We've based our life style on that. We drive to work, drive to the supermarket, drive to the movies, drive everywhere. We like it. We don't want to change. But we know that we're going to die if we keep driving internal combustion engines. We're polluting the air. Even the trees up in the mountains are dying because of smog. And we're going to die, too, if we don't do something about it, and soon!

I think the important thing to remember in driving is that everybody else is just a person, too; and people make mistakes. You have to presume that other people are going to make mistakes. You know, if you try to relate to people, people to people, driver to driver, instead of machine to machine, it's much safer

GETTING INTO IT

Part II

Last month when we discussed getting to know a motorcycle we touched only briefly on mechanics and mechanical conditions. However, having your bike in top condition is an essential prerequisite for fun and safe motorcycling. So this month we're going to talk about making pre-ride inspections before we get into riding techniques in our next installment.

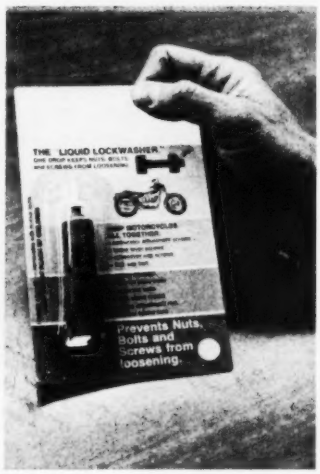
Good mechanical condition is important for reliable motorcycle operation. But *regular* inspections and maintenance are a must with a bike for a couple of related reasons. One, every part of a motorcycle is essential—on a bike your life literally depends on every part doing exactly what it should. And two, the high vibration levels of most motorcycles tend to make parts work loose or out of adjustment with great regularity. This can cause very bad problems—like it just isn't cool to see the front wheel go shooting off when you're steaming down the freeway.

So a thorough mechanical inspection at least every week and a good check of the essentials every time you get on the bike is the way to go. Although some new riders don't really get into the mechanics of their bike until they've ridden for a while, you don't have to be a super-wrench to make your own inspections and do routine maintenance. It just takes a bit of knowledge of your bike that you should already have picked up. And in addition to keeping your machine in top running condition, regular inspections make your bike safer, save you bread by cutting maintenance costs, and make riding more fun by eliminating unnecessary breakdowns.

The following list includes many of the important maintenance checks that should be performed on a regular basis. You should also study your owner's manual and possibly a service manual to determine what other checks need to be made on your bike. A service manual is also invaluable when performing required maintenance. Figure 1 contains sample checklists for a regular as well as a basic pre-ride inspection that you can use to help formulate your own lists.

NUTS AND BOLTS

Without a doubt the most important regular motorcycle maintenance is checking and tightening all nuts, bolts, and fasteners. You should put a wrench to all major fasteners every couple of days, paying special attention to engine mounts, side case screws, and the wheel axle nuts. Using special "loc-titing" compounds on all fasteners which aren't removed frequently to help eliminate vibration loosening is also highly recommended.



Check all nuts, bolts, and fasteners for proper torque every couple of days. Special locking compounds help prevent vibration loosening.

TIRES

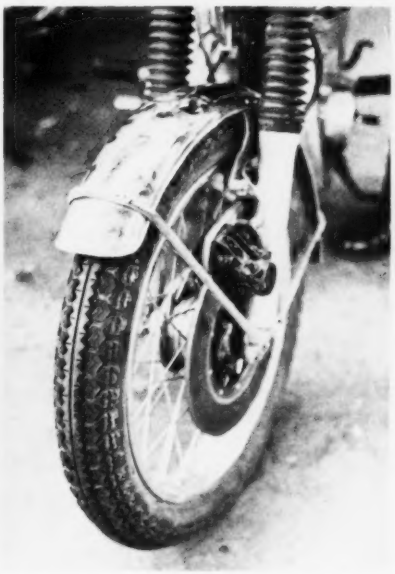
Tire inflation pressure is very important for proper motorcycle handling—check it daily with an accurate tire pressure gauge. The cold inflation pressure should be maintained at the levels recommended for your bike in the owner's manual or by a reputable shop. In addition to insuring proper handling and tire wear, regular pressure checks allow you to spot a slow leak which could lead to a tire failure. You should also note how your tires look when properly inflated so you can visually check them each time you get on the bike.

When checking the inflation, look for any tire structural damage and remove stones and foreign debris from the tread.

Check the tires periodically for tread wear. As mentioned last month, the tread depth of the front tire must be measured on the tire's edges since this is where wear occurs during cornering. When the left edge of the front tire is worn down to 1/16-inch, the tire should be replaced. The important thing is not to judge a front tire's condition by the center tread portion alone. The rear tire wears primarily in the center during acceleration and braking and can be easily

checked for tread depth.

When new tires are needed, be sure to get the tires which fit the type riding you do. Many dual-purpose machine riders use knobbies even though they actually do most of their riding on pavement. But if you're a pavement scratcher your best bet is to use street tires, or at least universals.

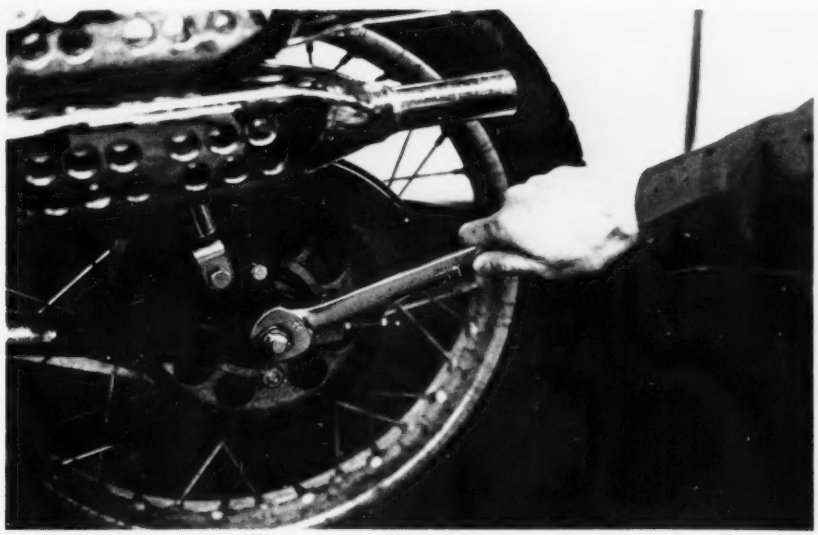


Good tire condition and correct inflation are essential for proper handling. Check them regularly.

WHEELS

The wheels should turn truely and be properly aligned so they track correctly. Have these items checked periodically at a shop, and whenever you develop a case of the wobbles or other tracking problems. Two important items you can and should check are the spokes and the axle lock nuts. Check for loose or damaged spokes by holding a screwdriver to the spokes as you spin the wheel. A flat or unusual pitch indicates a bad spoke. Loose spokes put excessive stress on the wheel and can cause it to go out of round or collapse—have any bad spokes tuned immediately at a shop.

You should also double-check to see that the front and rear axle lock nuts and locking mechanisms are properly installed and tight.



Wheels should be checked periodically by a shop for balance and trueness. Check the spokes by laying a screwdriver across them with the wheel spinning. An unusual pitch means a loose spoke. Double check axle lock nuts and fasteners every few days.

continued

Brakes should operate, be properly adjusted, and all cables and connections should be tight and lubed. Check the disc brake fluid reservoir daily.

BRAKES

The brakes should be disassembled periodically and the drums and linings checked for wear, or in the case of disc brakes the pads and rotor inspected. On a regular basis you should check all linkages and cables and keep the brakes properly adjusted.

The rear brake should be adjusted until the least amount of brake pedal travel produces maximum braking—allowing for about a half-inch of free play or whatever amount you like as long as the brakes don't drag. The adjustment is made on most bikes by turning an adjustment nut located near the rear drum. Your manual should clarify this procedure.

The front brake is the most important brake on a road bike and must be properly adjusted to get max utilization from it. The front brake should be adjusted so it feels good to you and will not lock the front wheel when applied full on. The adjustment is usually made with the adjustment nut on the brake lever. Check your owner's manual for the specs on your bike. Many newer road bikes have disc brakes on the front wheel—the adjustment (if possible) varies with disc brakes so check with a shop or your manual for this type brake.

The brake cable or linkage is another important item to check. Mechanical brake linkages are used on some rear brakes and should be checked to make sure all connections are tight. Most brakes use cables that should be checked for rusting, fraying or any damage which could make the cables hang up in the outer coverings. Lubing the cable—a very important maintenance item—will be covered later. Disc brakes are hydraulically controlled just like automobile brakes and don't have mechanical linkages. However, they have a brake fluid reservoir that should be checked. The fluid reservoir is usually located on the handlebar and is checked by simply unscrewing the top. If the fluid level drops, trace the brake lines immediately for leaks.

SUSPENSION SYSTEM

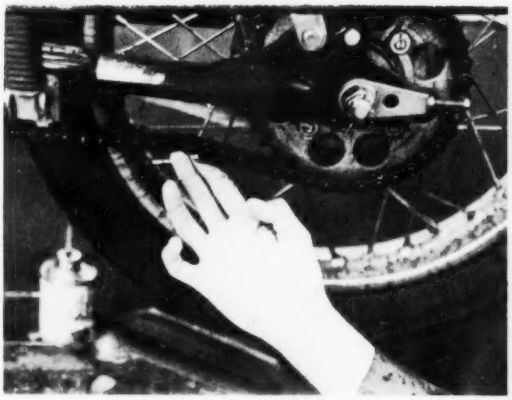
Front forks and rear shocks must provide proper damping for the bike to handle right. To check them, simply push down on the front and rear of the bike. If the front goes down easily and bounces several times before stabilizing, the forks are probably low on oil or require a heavier-weight oil. Check the required weight and amount of oil and refill the forks after draining out the old oil. If oil is leaking down the sides of the forks, the seals are leaking and should be replaced. Rear shocks are easily replaced when damping is lost.

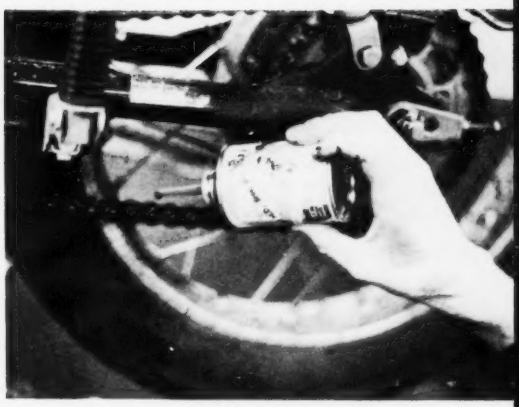
STEERING

Handlebars should be comfortable and fit the type riding you do. One tip on bars is to keep them snug but don't torque them down as tightly as they'll go. This way there's a good chance they will move at the clamps and not bend in a spill. Also be sure to keep the steering damper adjusted for the riding conditions. A firm setting is usually best for road cruising while a lighter setting works when you have to do a lot of maneuvering.

DRIVE CHAIN

To prevent long walks and severe leg injury if it snaps, the chain should be kept clean, lubed, and properly adjusted. There should be about ½-inch of free play between the sprockets when you're sitting on the bike. Adjust the chain by loosening or tightening the wheel adjusting bolts at the rear wheel. Usually the rear wheel has to be loosened at the axle to adjust the chain tension, but on some wheel set-ups it's not necessary—check your manual. Check the chain for kinks and lube it every week or so. Special chain sprays or lubricants work very well; however, you can lube the chain by dropping light oil on it as you spin the wheel slowly. Be sure the lube gets all the way through the chain and onto the sprockets.





The drive chain should have one-half to one inch of play between the sprockets when you're sitting on the bike. Keep the chain well-lubed to prevent kinking and eventual snapping.

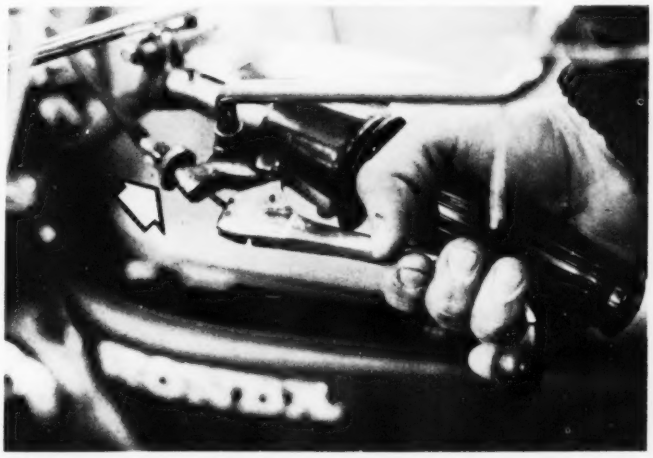
Lube control cables regularly to keep them from sticking or breaking.

CONTROL CABLES

The metal cables which are used to control the clutch, throttle, and brakes are essential, but prone to wear. The cables can fray and bind, causing sticking throttles and non-working brakes and clutches. Cables should be lubed about once a week with light oil to help prevent rusting and to keep them working freely. There are several methods for lubing cables, including special commercial applicators with needles which fit down into the cable. However, an easy method is to remove the cable from the control lever and tie a plastic bag of light oil firmly around the end of the cable. Then turn the bag upside down and let the oil seep down the entire length of cable. Replace the cables when frayed, stretched, or damaged in any way.

CLUTCH

A properly adjusted clutch makes riding safer and easier. Set the clutch so it engages and disengages to your liking by turning the adjusting nut on the clutch lever and/or engine side casing. The clutch should also be adjusted so there isn't any drag when the gears are shifted. A quick check for this adjustment is to compare the idle speed with the engine speed while the transmission is in gear and the clutch lever in—it should be about the same.



Clutch and brake controls should be properly positioned and adjusted. Adjustments are made by turning the adjusting nut on the control lever (arrow).

continued

THROTTLE

The important thing with the throttle is to be sure to keep the cable lubed so it doesn't bind or stick. Also, the spring action in the throttle should be set so the throttle snaps off when you remove your hand. A small screw on the underside of the throttle mount usually controls the spring action.

LIGHTS

Since being seen on the road is one of the biker's biggest problems, lights are very important. Most bikes tend to run through headlight and taillight bulbs pretty quickly, so you should always carry spare bulbs when possible. Taillight bulbs can be wrapped in sponge rubber and carried in the bike's tool kit. However, most bikes use sealed-beam headlights which are expensive and a hassle to carry around. So the best policy is to replace the headlight as soon as one beam burns out. That way you won't lose your headlight on the road if you lose one beam. The headlight on most bikes also gets out of adjustment rather easily—so check that your low beam illuminates objects at 200 feet and your high beam reaches around 350 feet with you on the bike.

ENGINE TUNE

The engine should be kept in fine tune and should run smoothly without any miss or hesitation. Be sure to keep spare plugs in case of a fouled plug. This is especially important with 2-strokes.

The following checklist outlines important areas for regular inspections.

PRE-RIDE CHECKLIST

1. **Fuel**—Tank filled, cock on, no leaks.
2. **Oil**—Transmission filled, engine oil level up, oil tank filled on oil-injected 2-strokes.
3. **Tires**—Properly inflated.
4. **Chain**—Adjusted, lubed.
5. **Brakes**—Operate, adjusted, fluid level up in disc brake reservoir.
6. **Lights**—All lights, including the brake light, operate.
7. **Mirrors**—Adjusted.
8. **Engine**—Runs properly, no miss or hesitation.

MAINTENANCE CHECKLIST

1. **Nuts and Bolts**—All nuts and safety fasteners tight, cotter pins in place.
2. **Tires**—Good general condition, properly inflated, plenty of tread, no foreign debris in tread, suited to riding conditions.
3. **Wheels**—Turn truely, properly aligned, no missing spokes, spokes adjusted, axle lock nuts tight and secured with safety devices.
4. **Brakes**—Properly adjusted, control cables in good condition, no grab or skip, linkages all tight, fluid reservoir topped off on disc brakes.
5. **Suspension**—Front forks filled with correct amount and weight oil, no leaks—provide proper damping, rear shocks—proper damping.
6. **Steering and Controls**—Bars adjusted and torqued down snuggly, steering damper set, clutch and brake controls positioned properly—but not bolted to the bars too tightly. This way they can move instead of breaking off in a spill.
7. **Drive Chain**—Clean, lubed, adjusted—not kinked.
8. **Clutch**—Properly adjusted, cable in good condition and lubed.
9. **Throttle**—Return spring works, cable lubed and in good condition.
10. **Lights**—All operate, including the brake light, carrying spare taillight bulb, both beams of headlight operate.
11. **Tune**—Engine runs right, un-fouled spark plugs.
12. **Center and Side Stands**—Properly fastened, return springs have tension to keep stands securely in up position.
13. **Muffler**—Legal—not noisy, baffles properly secured.
14. **Lubrication**—Grease fittings lubed, oil clean and at proper levels, injection tank filled (oil-injected 2-strokes), no oil leaks, transmission case filled.
15. **Battery**—Connections tight and not corroded, water level up.
16. **Fuel Tank**—No leaks.
17. **Foot pegs**—Firmly attached.
18. **Seat**—Firmly attached.

KNOW YOUR RESTRAINT SYSTEM

There are two types of restraint systems in use in today's cars. The vehicle-sensitive reels found in most new U.S. cars are locked only by a panic stop or crash, which swings a small pendulum forward and engages the reel pawl. No amount of smart snapping by the wearer will lock up these reels under ordinary conditions and some belt jerkers are afraid this means the restraint system is faulty. It doesn't.

The web-sensing reel or aircraft type is a different story. With this equipment, the shoulder belt should be snug when your fist is inserted between your chest and the belt. The lap belt should be tight, but not uncomfortable, and worn as low as possible on the pelvis.

If the shoulder belt and lap belt are separate units, don't wear the shoulder belt without the lap belt. You risk serious neck injuries in a crash if you do.

1973 DRIVER INDEX

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FOLLOWING DISTANCES

Everybody know the rule about following distances? "One car length for every 10 miles an hour of speed." Groovey.

So if your car is 10 feet long and you're driving 55 mph, you should be 55 feet behind the car in front of you. Easy, isn't it?

Now let's see. How do you judge 55 feet? Well, that's about two-thirds the distance between homeplate and first base. Or if you take 5 guys and have them lie down head to toe in the road . . . No, that won't work. Where can you find 5 guys who are 10 feet tall? Come to think of it, maybe your car isn't 10 feet long either.

Well, by the time you get through these wizard calculations, you're tailgating for sure.

So cheers to the Boeing engineer who came up with a simple way to judge following distance. It's called "the two-second rule." When the car ahead passes a landmark (a roadside sign or a tree, for instance), you start counting, "one thousand and one, one thousand and two." If you pass the same marker before you have finished counting, you're following too close. Slow down and try it again. When you have adjusted your speed so that you pass the marker just as you finish counting, you're at the correct following distance.

The beauty of the two-second rule is that it works at any speed, because the car ahead is traveling at the same relative speed.

ABOUT MISS DRIVER

(back cover)

Tiny Paula Maly is a native Californian who was raised in Omaha, Nebraska. She says she learned the techniques of safe driving during those long, icy Nebraska winters. Paula enjoys swimming, tennis and her job as a security clerk for the Air Force.

IT ALL ADDS UP

WITH THIS	YOU LOSE THIS
Ignition timing off 5° from proper setting	.5 mpg
One plug misfiring half the time at 60 mph	1.2 mpg
Tires 4 pounds below recommended pressure	.5 to 1 mpg
Wheels out of line	.3 mpg
Every 5 mph over 50	1 mpg
Flutters of plus or minus 5 mph at 50 mph cruising speed	1.3 mpg
Each 100 pounds extra carried in trunk	.2 mpg
Jack-rabbit starts and frequent stops	1.6 mpg

(Bob McCurry, Chrysler)

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(Bob McCurry, Chrysler)

See the driver. See the young driver. See the young, low-income driver.

Some basic facts you need to know about your car insurance

AN INSURANCE PRIMER

When a rap session about cars gets around to the subject of insurance, everybody wants to talk at once. Among the wailing chorus of complaints, you'll hear two voiced long and loud:

- Why should our rates be so high just because of our age?
- Why don't all the states vote for no-fault and save us some money?

Car insurance is a complicated subject. Whole books are devoted to it. But all that most of us really know about insurance is that we have to have it and it costs a bundle.

Everything about cars is expensive these days. In 1971, the last year for which complete figures are available, the American people spent 85 billion dollars on cars and related expenses; that was 12½% of their total personal outlay. Most DRIVER readers, being young and not exactly in the high-income brackets, spend a good deal more than 12½% of their income on their car and its related expenses. But there is probably nothing you own that is potentially as important as your insurance, especially your liability insurance.

WHAT IS INSURANCE?

When you step into your own car, you step into the expensive world of auto insurance. It wasn't always like that. In the beginning, automobiles were a toy of the rich. If someone were injured by the negligent operation of an automobile and could prove it in court, he collected from the driver because the rich could pay their own way in the personal-injury lawsuits.

But when Henry Ford came along and made it possible for almost any American to be a car owner, things changed. Soon there were many drivers who could not pay for injuries or damage they caused to others. And so insurance, which in some form or other has been with us for 4,000 years, moved into the world of the automobile

The idea of insurance is fairly simple. A group of people each pays a specified amount (a premium) into a fund. When individuals belonging to the group suffer losses, the loss is paid for out of the fund. In this way, the expense does not fall heavily upon the actual loser but is divided among the many individuals in the group who were exposed to similar risks but who did not all suffer losses. The amount of the premium is determined by the risk involved.

If you will look at Figure 1, you will see why young drivers pay higher premiums. Drivers under age 30 are involved in proportionately more traffic accidents than older drivers are. In 1971, drivers in that age group made up 31% of the driving population of the United States but were involved as drivers in 47% of all accidents and 46% of fatal accidents. The highest rate of involvement in fatal accidents is among drivers 20 through 24 years of age. People in this group must contribute more money into the fund (pay higher premiums) because more individuals within the group can be expected to suffer losses which must be paid for out of that fund. In other words, they represent a greater risk.

Figure 1 answers another question frequently raised by DRIVER readers. "Why does my Great Aunt Martha, who is 70 years old and drives like she's the only one on the road, pay a lot less than I do for insurance?" She pays less because she represents a smaller risk to the insurance company—she has fewer accidents. Of course, she's not as good a driver as you are. But she doesn't drive much at freeway speeds, usually is safely at home during peak traffic hours, and in general doesn't have the *exposure* to accident situations that you do. Her group doesn't generate a lot of claims against their insurers and their premiums stay lower.

KINDS OF COVERAGE

When you buy car insurance, you are buying a number of different kinds of protection. There are five basic types of coverage:

Liability: Liability insurance pays, within stated limits, for injuries and losses of other people when you are at fault. It does not cover injury to you or

See the young, low-income, high-risk driver.

See the young, low-income, high-risk driver buy his automobile insurance.

See the premiums the insurance company lays on the young, low-income, high-risk driver.

Accidents by Age of Drivers

Compilations based on reports from state traffic authorities show that drivers under age 30 are involved in a disproportionately high number of traffic accidents. In 1971, drivers in that age group comprised 31.8 percent of the motoring population of the United States, but were involved as drivers in 47 percent of all accidents and 45.9 percent of fatal accidents. The highest rate of involvement in fatal accidents is among drivers 20 through 24 years.

Age Group	Number of Drivers	% of Total	Drivers in All Accidents	% of Total	Drivers in Fatal Accidents	% of Total
0-19	11,700,000	10.3	4,700,000	16.6	10,100	14.9
20-24	12,900,000	11.3	5,200,000	18.4	12,800	18.9
25-29	11,600,000	10.2	3,400,000	12.0	8,200	12.1
30-34	10,900,000	9.6	2,700,000	9.6	7,100	10.4
35-39	10,900,000	9.6	2,400,000	8.5	5,150	7.6
40-44	11,300,000	9.9	2,100,000	7.4	5,150	7.6
45-49	11,200,000	9.8	2,100,000	7.4	4,800	7.1
50-54	9,900,000	8.7	1,650,000	5.8	3,700	5.4
55-59	7,800,000	6.8	1,450,000	5.1	3,100	4.6
60-64	6,000,000	5.3	1,000,000	3.5	2,700	4.0
65-69	4,500,000	3.9	850,000	3.0	1,900	2.8
70-74	3,100,000	2.7	350,000	1.3	1,350	2.0
75 and over	2,200,000	1.9	400,000	1.4	1,750	2.6
Total	114,000,000	100%	28,300,000	100%	67,800	100%

Source: National Safety Council

Fig. 1

Cry, driver, cry.

Cry, cry, cry . . .

damage to your property. Liability is the most vital form of protection and you *should not drive* without it.

If you don't have liability coverage and are sued as the result of an accident, you could lose many of your personal assets, your real estate, even some of your future income. Your license could be suspended until judgment is satisfied.

Read in any newspaper about the large sums of money awarded by juries in auto accident trials, and you will know why you should not skimp on this coverage.

Medical Payment Coverage: Medical, hospital, or funeral expenses are included in medical payment coverage for you or your passengers if injured or killed in your car and, in some circumstances, for you or others injured or killed while riding in someone else's car or when struck by a car.

Medical payment coverage pays regardless of who caused the accident; the amount of payment is determined by the policy. This is a relatively inexpensive insurance.

Collision Coverage: Damage to *your* car caused by collision or upset is covered under collision insurance, and protects you regardless of who was at fault. Full coverage collision is so costly that most drivers carry a deductible policy. A deductible policy means that you pay a specified amount (usually $50 or $100) and the company pays the balance.

If you have a car more than five years old, you may not wish to buy collision coverage. You would have to decide whether it would be wise to pay about $50 for $100 deductible collision insur-

continued

ance which would pay you a maximum of $400. If you are in this situation, consider your driving record. Since you generally collect on collision insurance when the accident is your fault, you might wish to dispense with collision coverage with an old car if you are a consistently good driver.

Claims for damaged cars outnumber those for bodily injury by more than seven to one, and that is why two-thirds of most auto insurance premiums go for vehicle damage coverage. The cost of repairing vehicles is very high, as we are well aware. *U.S. News & World Report*, in its excellent book "Your Car —How to Buy It, Take Care of It, and Save Money," says that if a $3500 car were destroyed, it would cost about *$15,000* in parts and labor for a garage to restore the vehicle to proper working order. Of course, no one would spend $15,000 to repair a destroyed car. But the point is that if a $3500 car suffered damages of only 10% in a crash, the cost to repair it would not be 10% of $3500, but 10% of the $15,000 or $1,500.

Comprehensive Coverage: Damage to your car caused by something other than collision is taken care of by comprehensive insurance. This includes damage from fire, theft, falling objects, larceny, explosion, earthquakes, windstorm, hail, water, flood, malicious mischief or vandalism, riot or civil commotion, and actual contact with an animal. Comprehensive coverage is also available on a "deductible" basis.

If you live in a big theft area, premiums for comprehensive may run quite high. (In New York City or St. Louis, the odds are one in five that your car will be stolen. This makes for stiff premiums.) As with collision insurance, you may not want to buy comprehensive insurance if your car is not worth enough to justify the expense.

Uninsured Motorist Coverage: You and your passengers are protected under this coverage from bodily injury losses caused by an uninsured or hit-and-run driver who is legally liable for the damage. If you are involved in an accident with a person who is unable to pay and does not have liability insurance, then even though the accident was his fault you may have to assume your costs. This protection does for you what liability insurance would have done if the other driver had insurance. Property losses are not usually included in this coverage.

Liability Insurance Required in the United States and Canada

UNITED STATES

State	Liability* Limits	State	Liability* Limits
Alabama	10/20/5	North Dakota	10/20/5
Alaska	15/30/5	Ohio	12.5/25/7.5
Arizona	15/30/10	Oklahoma	5/10/5
Arkansas	10/20/5	Oregon	10/20/5
California	15/30/5	Pennsylvania	10/20/5
Colorado	15/30/5	Rhode Island	10/20/5
Connecticut	20/40/5	South Carolina	10/20/5
Delaware	10/20/5	South Dakota	15/30/10
District of Columbia	10/20/5	Tennessee	10/20/5
Florida	25/25/5	Texas	10/20/5
Georgia	10/20/5	Utah	10/20/5
Hawaii	10/20/5	Vermont	10/20/5
Idaho	10/20/5	Virginia	20/40/5
Illinois	10/20/5	Washington	15/30/5
Indiana	15/30/10	West Virginia	10/20/5
Iowa	10/20/5	Wisconsin	15/30/5
Kansas	15/30/5	Wyoming	10/20/5
Kentucky	10/20/5		
Louisiana	5/10/1		
Maine	20/40/10		
Maryland	15/30/5	**CANADA**	inclusive**
Massachusetts	5/10/5		
Michigan	20/40/10	Alberta	$35,000
Minnesota	10/20/5	British Columbia	$50,000
Mississippi	10/20/5	Manitoba	$50,000
Missouri	10/20/2	New Brunswick	$35,000
Montana	10/20/5	Newfoundland	$35,000
Nebraska	10/20/5	Nova Scotia	$35,000
Nevada	15/30/5	Ontario	$50,000
New Hampshire	20/40/5	Prince Edward Island	$35,000
New Jersey	15/30/5	Quebec	$35,000
New Mexico	10/20/5	Saskatchewan	$35,000
New York	10/20/5	Northwest Territories	$35,000
North Carolina	10/20/5	Yukon	$50,000

* The first two figures refer to bodily injury liability limits and the third figure to property damage liability. For example, 10/20/5 means coverage up to $20,000 for all persons injured in an accident, subject to a limit of $10,000 for one individual, and $5,000 coverage for property damage.

** The "inclusive" limit means there is $35,000 of liability insurance available to settle either bodily injury or property damage claims—or both—up to that amount.

Source: American Insurance Association

Fig. 2

HOW RATES ARE FIGURED

DRIVER readers often ask, "Why can't insurance companies judge each of us as individuals so that the really good drivers would not pay so much?" The companies say that this is not practical nor even possible. They use rating scales for establishing the cost of insurance. The American Automobile Association lists the following scale:

- Type and amount of coverage purchased.
- Make, model, year, and cost of the car.
- Cost of repair.
- Accident experience in the region you live.
- Accident experience of those individuals driving your car.
- Driving record of drivers using your car.
- Your occupation, how you use your vehicle, where your garage is, and the number of miles you drive.
- Number of people using the car.
- Your age, sex, and marital status. If you are under 25, the premiums will

be higher. Generally, males under a certain age will pay more than females. Both groups will pay more if single and under a certain age, generally 25, but some companies go as high as 29 years old for both men and women.

This is not an all-inclusive list but gives a general idea of what influences insurance costs. Some companies use a merit rating plan which reduces the cost of insurance when there are no accidents but increases the cost for each mishap. One accident, whether or not you are legally at fault, can increase the premium.

If your accident record with an insurance company is bad, you may be considered a risk that no company wants to insure. Insurance companies reserve the right to cancel your policy. If your accident record proves you a poor risk, you may have great difficulty in getting insurance. If you are, you will have to pay a higher premium as an "assigned" insurance risk. (The state actually assigns you a particular company. In this way, each company carries its proportionate share of these drivers.)

SAVING MONEY

An insurance company charges premiums according to the risk it is taking, and it calculates that risk according to statistics (called actuarial tables). DRIVER readers sometimes ask us why insurance on sports cars is high. It's because the company knows it risks having to pay out more money in claims on such a car so it charges more for coverage.

The Air Force's own statistics bear this out. In 1972 and 1973 Air Force people were involved in 2,026 single-vehicle accidents. 491 of them were driving sports cars and 595 of them were riding motorcycles. Over half of the single-vehicle accidents involved just those two types, far out of proportion to the number of people using them.

■ So one way to bring down the cost of your insurance is to buy the kind of car that carries lower rates—generally speaking, that's a small car that is not a sports car.

■ Your driving record is extremely important. Don't be a collector of traffic tickets. Your insurance company finds out when you are cited, and your premium will go up accordingly because people who get tickets are greater risks to the company—eventually they will have an accident.

■ If you have had formal driver-education courses (and if you're in the Air Force you have had) be certain your insurance company knows about it.

■ If you're a non-drinker, look for a company that offers lower rates for this.

■ Shop around for your insurance. Ask the agents how the companies handle claims and what their policies on cancellation or nonrenewal are. Check three or four companies—rates for identical coverage can cost much more with one company than with another.

WHAT ABOUT NO-FAULT?

No-fault insurance is a system whereby your own insurance company pays your actual cash loss as a result of bodily injury, regardless of who was at fault. Theoretically, there would be no reason to sue. Actually, suits will still occur when medical expenses exceed an amount fixed by the law or when death, dismemberment, disfigurement or permanent disability result. No-fault isn't a new idea, but it has gained a lot of support in the last few years because of the steadily rising cost of insurance, the slow payment of claims, and the burden accident cases place on our court system.

Stop crying—someday you'll be an old, rich, low-risk driver who drives 20 mph to the store and back at 0900 when all the young, poor, high-risk drivers are at work.

It is important to understand that when we talk about no-fault insurance, we are speaking only of bodily-injury liability insurance. (Comprehensive and collision coverage already are no-fault because your company pays you regardless of fault.)

An excellent explanation of no-fault insurance appears in an article by Tom Lankard in March '74 *Road & Track*. Lankard uses as an example an accident in which he himself was involved while riding as a passenger in a Triumph Spitfire in 1965. "As a serviceman my medical costs were absorbed by Uncle Sam, my single cash outlay being for the emergency ambulance service by which I was removed from the scene of the accident while awaiting the arrival of transportation to the Naval Hospital. Under the fault system in effect then as now in most states, the insurance company of the negligent driver (of what I can only recall as being an enormous blue station wagon which turned in front of us) *compensated* me for the wrong, which came to something quite a bit more than a mere reimbursement of my $35 ambulance charge. For an injury such as my minor scalp laceration, the company followed a rule of multiplying my cash outlay by a factor of three; thus I received, as compensation for my pain and suffering, $105 plus the actual $35 I had had to spend. Under the no-fault system, my recovery would have been limited to a simple reimbursement of my expenditure of $35, and that remibursement would have been made by the insurance company *of the driver in whose automible I had been a passenger, even though he was not the negligent party*, and the same pattern would have applied in turn to his own reimbursement."

Lankard has serious doubts that the so-called no-fault plans will have all the advertised effects. For one thing, he believes the rate structure may be reversed so that the small car driver will be paying more than the large car driver. With the fault systems, small-car owners pay less because victims of the negligent operation of small cars suffer less severe injuries than do victims of larger cars. And it is the victim who must be paid.

With no-fault, the company will compensate its own policy holder, not the victim. Because the big-car driver is less likely to be severly injured, it would seem likely that the company's risk would be less and so his premiums would go down as the small-car owner's went up. Lankard sees this as eventually affecting the type of automobile sold in this country; the car enthusiast will find himself driving a tank-like vehicle instead of a performance machine.

Massachusetts was the first state to adopt no-fault insurance and bodily injury premiums were cut 15% the first year, with additional cuts in succeeding years. Florida, the second state to adopt a no-fault plan, experienced similar results.

To date, 19 states have adopted some form of no-fault insurance and the United States Senate has national, no-fault legislation before it in the present session.

This explanation of insurance is a long way from being a complete one, and insurance is by no means as simple as we have tried to make it. Our purpose has been to touch on some of the basics you should know before you go out to buy an auto insurance policy.

THE BACKYARD MECHANIC

BRAKE HYDRAULIC SYSTEM

In our last "Backyard Mechanic" we covered relining drum brakes. However, we postponed until this month discussion of basic hydraulic system checks and maintenance needed to get your car's brakes in top condition and keep them that way. So we'll run through these jobs here, and next month we'll finish off brakes by covering power brake service.

These three articles, along with the "Backyard Mechanic" on disc brakes in the May '73 DRIVER, should have you covered for any routine brake service your car is likely to require. But as with any mechanical problems, if you have baffling brake trouble we recommend that you see your friendly mechanic or a good specialty shop.

HYDRAULIC SYSTEM

Most people know that their brakes are hydraulically activated—even though they may not know exactly why or how. But the reason your brake system operates with fluid pressure involves a basic law of hydraulics that is quite simple. Essentially, a fluid cannot be compressed by pressure and is therefore an excellent transfer medium (Fig. 1, page 24).

Since your car's brake sysem is basically an airtight network of cylinders and lines filled with fluid, what this means is that when you step on the brake pedal and create pressure in the system, the pressure has to go somewhere. If the brake system is in good working condition the pressure ends up at the wheel cylinders (or pistons on disc brakes), where it is relieved when the cylinders or pistons expand and force the brake linings against the drum or disc.

As long as you have brake lining and an airtight hydraulic system filled with fluid, you're going to stop. But if you have a leak in the system that allows the pressure to escape before it reaches the wheels, you won't stop so good. And if you lose enough fluid or get enough air in the system you won't stop at all —as we've all seen on the tube when the bad guy drains the fluid from the master cylinder of the good guy's car.

SYSTEM CHECK

So if you want to keep stopping you should check the hydraulic system regularly to be sure the fluid level is up and the system is not leaking. A quick and easy check is to simply depress the brake pedal and hold it down with plenty of force. If the pedal stays firm the system is okay. But if the pedal gradually sinks to the floor, there's a hydraulic leak somewhere. If your car has power brakes or vacuum-assist disc brakes (which most newer cars have) this check should be made both with the engine running and with the ignition off. When performing the test with the engine off, pump the brake pedal six or eight times to release the vacuum before holding the pedal down.

Any time the pedal fails to hold firm you should immediately find and repair the leak before it results in brake

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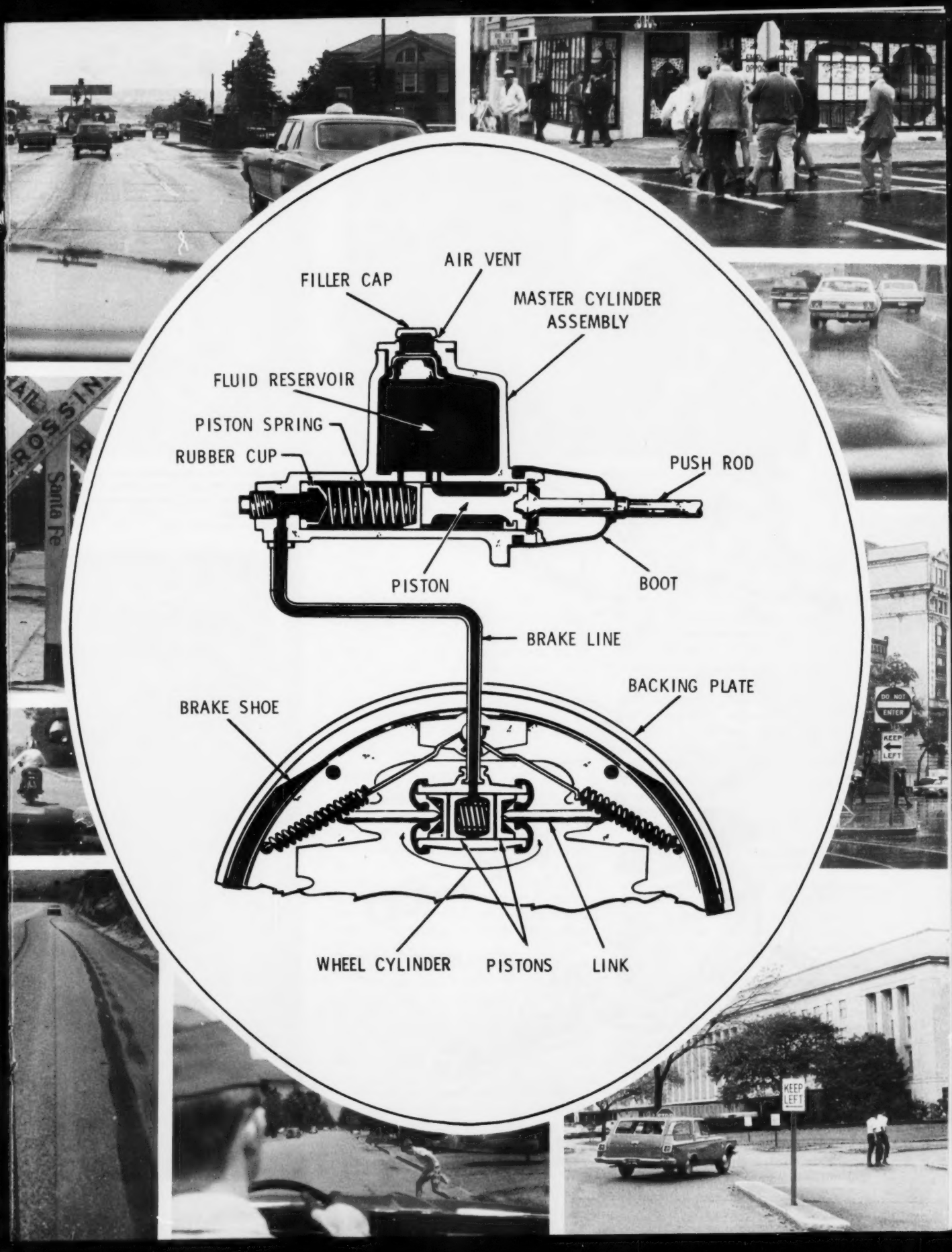

AIR VENT
FILLER CAP
MASTER CYLINDER ASSEMBLY
FLUID RESERVOIR
PISTON SPRING
RUBBER CUP
PUSH ROD
PISTON
BOOT
BRAKE LINE
BACKING PLATE
BRAKE SHOE
WHEEL CYLINDER
PISTONS
LINK
Santa Fe
DO NOT ENTER
KEEP LEFT
KEEP LEFT

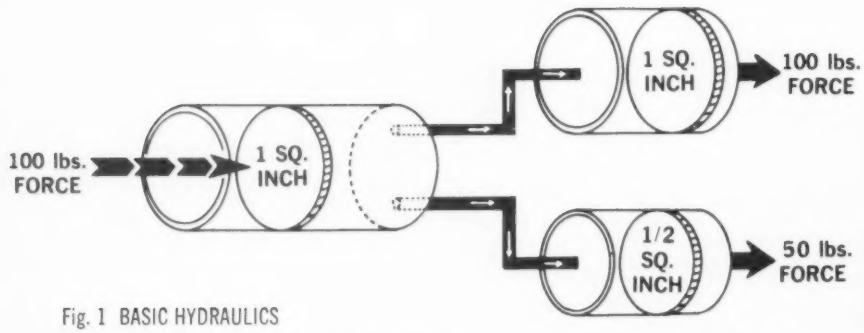


Fig. 1 BASIC HYDRAULICS

Principle of hydraulics illustrated. 100 lbs of force in the main cylinder is applied, such as your foot on the brake. This pressure is exerted equally in all directions, so there is 50 pounds of force against a cylinder with a 0.5 square inch bore, and 100 pounds against a cylinder with a one square inch bore.

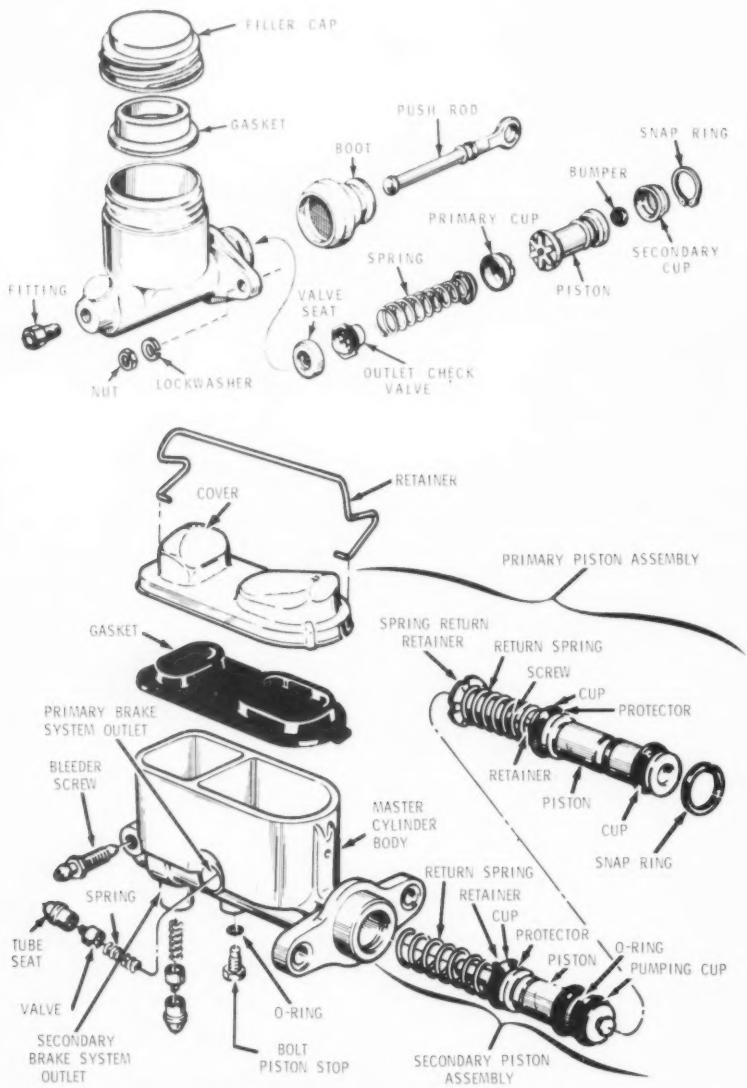


Fig. 2 MASTER CYLINDER DISASSEMBLY

To disassemble master cylinder, pull rubber boot and pushrod out, remove snap ring, and slide other parts out. Obviously, dual master has many more parts. For proper reassembly, note order in which yours come out.

Check the hydraulic system by depressing the brake pedal and holding it firmly. If the pedal stays up, the system is okay. But if the pedal sinks slowly to the floor there is a hydraulic leak.

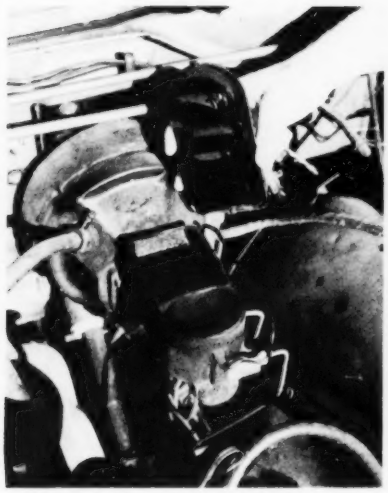
Fig. 3
BASIC BRAKE BLEEDING

1. Clean the bleed screw at each wheel.
2. Attach a small rubber hose to one of the bleed screws and place the end in a container of brake fluid.
3. Top up the master cylinder with brake fluid. (Check often during bleeding). Pump up the brake pedal and hold.
4. Open the bleed screw about one-quarter turn, press the brake pedal to the floor, close the bleed screw and slowly release the pedal. Continue until no more air bubbles are forced from the cylinder on application of the brake pedal.
5. Repeat procedure on remaining wheel cylinders.

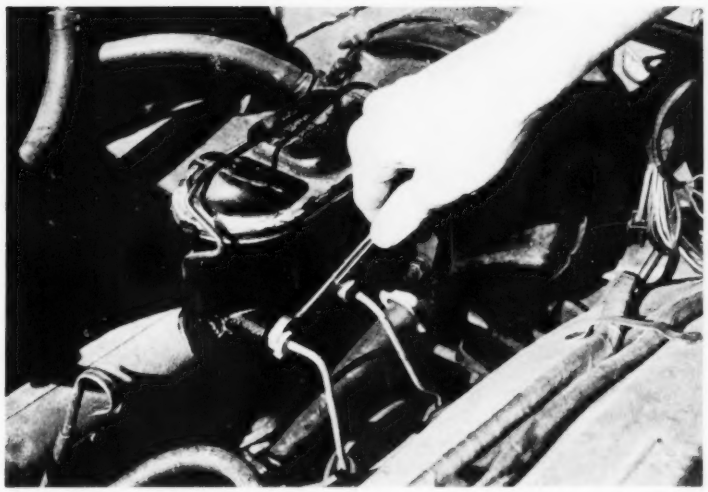
Master cylinders equipped with bleed screws may be bled independently. When bleeding the Bendix-type dual master cylinder it is necessary to solidly cap one reservoir section while bleeding the other to prevent pressure loss through the cap vent hole.

Disc brakes may be bled in the same manner as drum brakes, except that:

1. It usually requires a longer time to bleed a disc brake thoroughly.
2. The disc should be rotated to make sure the piston has returned to the un-applied position when bleeding is completed and the bleed screw is closed.



Check the master cylinder fluid reservoir regularly. Before popping the top, clean it thoroughly to keep gunk from contaminating the fluid. A low fluid level may mean a leak—inspect immediately.



Remove the brake lines very carefully, when pulling the master cylinder.

failure. But even if the system checks out okay, it's a good idea to make a quick inspection of the hydraulic system as a preventive measure.

BRAKE LINES

Although the master cylinder seems like the most logical place to start a hydraulic system inspection your best bet is to begin with the brake lines. This way, if you have a leak it will be isolated to either the lines or the master cylinder immediately—the master cylinder sometimes appears to be leaking when it's not.

You should be able to check the brake lines without raising the vehicle if you don't mind grubbing on your back. But if you raise the car on stands or ramps to make the inspection easier, be doubly sure the supports are properly secured and the vehicle is chocked. And of course don't get any further under the vehicle than necessary, or stay under any longer than you have to.

If the brake line connections at the wheel are tight, check the back side of the tire and backing plate very carefully. Leaking wheel cylinders generally leave a telltale splotch of brake fluid here. Next, inspect the flexible hose that connects the main metal brake line to the brake, if your car has these type lines. The flexible hoses are subject to deterioration and should be replaced if they show any signs of leaking, are damaged, or even feel gummy. Because metal lines are tougher, many newer cars have done away with the flexible connectors and use one-piece metal brake lines.

After checking the wheel area for fluid leaks, trace the length of metal line from each wheel to the master cylinder. The main lines should be inspected for leaking connections, dents, and signs of abrasion at points where the lines turn or bend around obstructions on the underside of the frame. If you don't spot any leaks along the brake lines, you can move on to the master cylinder.

MASTER CYLINDER

The master cylinder is the heart of the hydraulic system. It is located in the engine compartment opposite the driver and connected to the brake pedal by a special rod. The master cylinder initiates braking when the brake pedal is depressed by pushing out a piston inside the cylinder, exerting pressure that is transferred through the system.

MASTER CYLINDER CHECK

Generally you'll know if the master cylinder fails since braking action will be greatly reduced, and on newer cars the pressure warning light on the dashboard should illuminate. But it's a good idea to check the unit for leaks when you check the fluid level in the reservoir.

The master cylinder reservoir should be checked regularly since fluid loss will indicate a leak in the system that you can track down and repair before it becomes serious. To check the fluid level, clean all gunk off the unit and then simply pop the wire bracket (or whatever locking device is on the top) and remove the lid.

If the level is down only slightly, check the brake line connections and refill the reservoir with fluid and check the level again in a couple of days—some fluid loss is normal. Although it's not likely the fluid level could be very low without your being notified by inferior braking and/or an illuminated warning light, you might discover a leaky master cylinder. If the unit is leaking anywhere but the brake line connections it should be rebuilt or replaced.

REBUILD

Rebuilding a master cylinder is not at all the complicated job many people think. Even with today's dual-master cylinders, which have about twice as many parts as the old single units, rebuilding is just a matter of removing the old parts and sticking in the new ones that come with the rebuild kit. We won't go through the procedure here, but a service manual as well as the rebuild kit give step-by-step instructions. However, we will offer a few tips you might not pick up from the instructions.

First of all, a few master cylinders are best replaced with a factory rebuilt unit. A manual should specify if the master cylinder on your car is rebuildable—most are. The first step in removing the unit is usually disconnecting the

continued

Check all brake line connections to be sure they're tight and not leaking. Trace the lines from the wheels to the master cylinder looking for leaks. Flexible-type connectors are especially vulnerable to deterioration and damage—inspect them extra carefully.

push rod at the brake pedal. However, on power-brake-equipped cars the push-rod generally activates the power assist and the rod *should not* be removed. Also, when removing the unit be very careful when disconnecting the brake lines. When you get the brake lines removed, all you have to do is pull the stoplight switch and unbolt the unit from the firewall or power unit.

Before disassembling the unit, clean it very thoroughly with alcohol. When you remove parts, clean each one in alcohol and lay it on a clean cloth in the order in which it was removed. Make sure the unit is clean on the inside and check the piston bore very carefully. The bore must be smooth and unmarred. If the bore is slightly damaged you can probably clean it with crocus cloth—but if it is badly scoured it must be honed smooth, or the entire unit replaced. Finally, when reassembling the unit be extra clean. Carefully follow the instructions step by step and lubricate all installed parts with *clean* brake fluid. Figure 2 has blow ups of a single and dual master cylinder which will give you an idea of the parts involved. The master cylinder generally should be bled after being rebuilt—this will be covered later.

FLUID

One of the most common causes of poor braking is contaminated brake fluid. As previously mentioned, the hydraulic system operates on the principle that fluids are not compressible. So even a small amount of air (which is highly compressible) in the system can seriously affect braking. The system should be bled whenever the brake pedal gets "spongy"—indicating contaminated fluid —or when the system is opened at the wheel cylinders or master cylinder during a brake job. But when you bleed the hydraulic system, it's a good idea to first flush the system with special brake system cleaner or denatured alcohol.

CLEANING

To flush the hydraulic system, you first need to bleed the fluid out of the master cylinder reservoir. Open the bleed screw(s) if the cylinder is so equipped, or loosen the brake lines at the unit. Have a buddy pump the brake pedal slowly but firmly while you catch the escaping fluid in a suitable container. Be sure not to let the fluid leak on the car—it can ruin the finish. When you've got most of the fluid out of the reservoir, tighten the bleed screw or brake line connections and you're ready to begin flushing.

Fill the master cylinder reservoir with cleaner or alcohol and go to the wheel closest to the master cylinder (usually the left front) and open the bleed screw on the backing plate behind the wheel. Here again you want to be sure to catch the escaping fluid. A length of rubber hose that fits over the bleed valve to carry the fluid to a container is a good idea. Also, you can use a special bleeding hose that has a valve in the end which doesn't allow air to bleed back in after the fluid escapes. These self-bleeders are available at any auto store for about $2 and allow you to bleed the entire system by yourself. They also make the job easier with a helper.

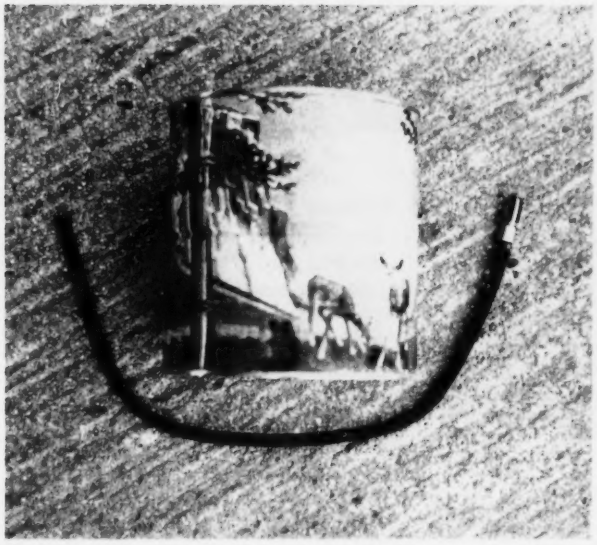
If you're using a bleed hose, just open the valve and pump the brake pedal slowly but firmly until the cleaning agent is expelled through the valve—then close the valve and follow the same procedure on all wheels until the entire system is purged of brake fluid.

If you're not using a bleeder hose, have your buddy depress the brake pedal while you open the bleed screw —he should tell you when the brake pedal is just about to the floor so you can close off the bleed screw to keep excess air from bleeding back in. Continue this procedure until the cleaner exits from the valve—then repeat the process on each wheel.

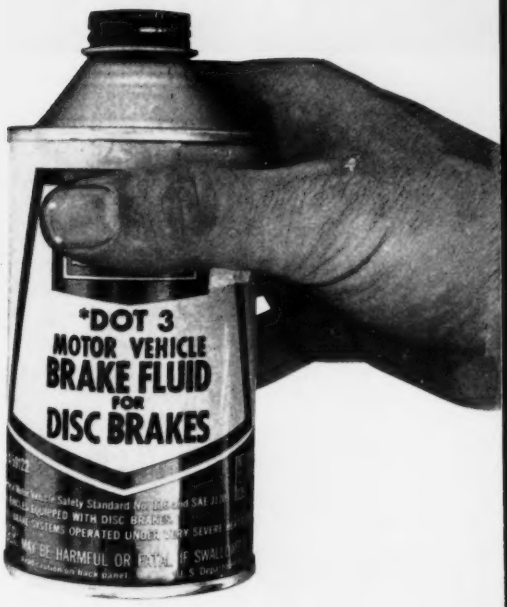
BLEEDING

When the system is flushed you can fill and bleed the system. The procedure is basically the same as with flushing the system but a bit of care must be exercised when bleeding out the air. First, bleed the cleaning agent out of the fluid reservoir. Then tighten all bleed valves and fill the master cylinder reservoir with clean brake fluid. Bleed the air from the master cylinder by opening the bleed screw (if so equipped) or loosening the brake line connections and pump the brake pedal until the escaping fluid doesn't make a sputtering sound. Close off the master cylinder connections and refill the reservoir.

Check a manual for the correct bleeding procedures and sequence for your car. Usually, brakes should be bled beginning with the wheel farthest from



Brakes can be easily bled by one person using a special bleeding hose available at any auto supply store.



Universal brake fluid is available. But top-quality heavy-duty fluid that fits the needs of your brake system is best.

Bleeding can be done manually by opening and closing the bleed screw as someone pushes on the brake pedal. Special bleeding hoses have check valves that prevent air from bleeding back into the system and eliminate the need for opening and closing the bleed screw. The hose is installed on the bleed valve and the brake pedal pumped until the air is released from the system. Brake fluid should be bled into a container and thrown out—never use old brake fluid for any purpose.

the master cylinder, working to the wheel closest, but this varies. Begin bleeding by opening the bleed screw on the appropriate wheel a quarter of a turn. Have your buddy depress the brake pedal slowly (as before) letting you know when the pedal is near the floor so you can close off the screw. Continue holding pressure on the pedal and opening and closing the bleed screw until all the cleaning agent is removed and a steady stream of fluid escapes. Now you're ready to bleed the air.

Following the same procedure of opening and closing the bleed screw while the brake pedal is depressed, listen as the fluid escapes through the bleed valve. When the fluid escapes without making a sputtering sound—the air is out of the line. This may take as many as a dozen openings and closings of the valve, so be patient.

After bleeding each brake, refill the master cylinder and replace the cap. Check the reservoir frequently while bleeding to be sure the level doesn't get low, which would allow air to be drawn in. Repeat the bleeding procedure on each wheel in sequence. If you are using a self-bleeder you don't have to worry about opening and closing the valve each time. Just install the hose, open the bleed valve and pump the brake pedal until the cleaning agent is expelled and you think the air is out. The special valve in the bleeder keeps air from bleeding back in.

When you've bled all four wheels the brake pedal should be up to the normal height, should not be spongy, and should hold pressure. If not, try the bleeding procedure again. If you're bleeding after relining the brakes, the pedal may not come up as you think it should if the brakes aren't properly adjusted. So check this before rebleeding the lines. Figure 3 outlines the basic steps for bleeding the brake system.

A few other hydraulic system problems you might encounter involve special proportioning and metering valves used in brake systems with front disc brakes and rear drums. We'll discuss these special devices as well as the pressure differential warning system in next month's power brake installment.

BACKFIRE

OUR GERMAN FAN

As an employee of the U.S. Army in Germany I have every once in a while an opportunity to read your fine magazine. I compliment you and your staff for the format and content of your publication, especially on the manner you provide helpful and money-saving tips and recommendations for the "normal driver." Though a good part of the technical matters discussed are limited to stateside vehicles and overall traffic circumstances, you touch numerous subjects which are applicable anywhere in the world, in particular on driving behavior and traffic safety. In general I might say that I consider your magazine one of the best of its type I have ever read.

Looking forward to the next issue of DRIVER.

Manfred Lahr
Schmidthachenbach
Germany

LOCKING UP

The December issue of DRIVER was excellent, especially all those gas-saving hints. As usual, however, your picture on page 7 was the highlight of the issue, where you made the point that it is always good practice to drive with all the doors locked.

Now there is obviously no reason to question your figures, but I'm not sure your facts in that article were absolutely true. There are some very good arguments *against* locking those doors.

First, is there any real evidence that a locked door is less likely to fly open in an accident? I doubt it, since the lock does nothing to alter the mechanical latching device, except to *bar its activation from the outside.* And that's the second point: a locked door, if it doesn't fly open, only impedes entry from without during attempts to rescue unconscious or helpless occupants. In other words, a locked door *could* come open in an accident just as easily as an unlocked one, but if it doesn't rescue efforts may be slowed considerably. So the way to play the accident percentages is to keep doors unlocked (but firmly shut, of course) and use three-point safety belts at all times.

You make another valid point of course, that of keeping doors locked for security at stoplights. This is especially true for girls alone in their cars, and is a serious concern . . .

All of these factors have to balance out, and I'd like to hear what the experts from DRIVER have to say on the matter.

Lt Col Michael E. Grant, USA
Commander & Control-EAST
112th M.I. Group
Ft. McClellan, AL 36201

Check some American-built cars of fairly recent vintage and you'll find that pushing down the button does do more than keep the door from being opened from the outside. The locked door cannot be opened with the handle from the inside either. In case of collision, the handle will not be actuated accidentally by a flailing arm or leg to open the door. One of the primary aims of safety engineers is to insure that the car doors stay closed in an accident. In fact, Department of Transportation Standard No. 206 —Door Locks and Door Retention Components—specifies load requirements for door latches and door hinge systems to minimize the probability of failure as a result of forces encountered in vehicle impacts. It really is better for the doors to stay closed in case of an accident, even if forcible entry is necessary to effect rescue of occupants.

$ $ $ $

DRIVER has become part of my monthly "must read" library. I personally have saved several hundred dollars from information on transmissions, chokes, tires, etc. "The

LETTERS TO THE EDITOR LETTERS TO THE EDITOR

Backyard Mechanic" should be compiled into one pub annually for placement in the home garage next to hard-to read service manuals.

Thanks for the money.

Ron Van Dyck, DAC
Department of the Army
Hq, Fort MacArthur
San Pedro, CA 90731

The many, many requests from you readers for copies of "The Backyard Mechanic" series have set us in search of inexpensive reprints. We think we have found a way to make them available—watch DRIVER for an announcement within the next couple of months.

COURSE AT CAPE MAY

After reading your article in DRIVER, December 1973, concerning the Emergency Evasion and Driver Improvement Course at Cape May, New Jersey, I became interested in attending this course myself. Who should I contact to apply for this course?

John B. Babbs, Jr.
U.S. Army Corps of Engineers
Baltimore, MD 21203

The person to contact is Mr. Ed Cook, Head Instructor, Drivers Training, Coast Guard Station, Cape May, New Jersey 08204.

CRAZY NUMBERS?

Your figure of $2.46 to drive 10 miles (Car Pool article—January 1974 issue) is ridiculous. Presumably this figure includes such items as car depreciation, insurance, maintenance, gas and oil. While it may be true that these are all genuine expenses during the year, it is not true that they are all variable costs—directly related to miles driven. Depreciation and insurance are, in the accountant's vernacular, fixed or sunk costs—you pay them whether you drive or not. Only the latter three are truly variable costs, and therefore they represent the true cost of the 10-mile trip (plus any other expenses such as bridge tolls, etc.).

I am not campaigning against car pools—to the contrary, I am very much in favor of them, but I am campaigning against misleading figures. To quote the saying, "figures don't lie, but liars figure."

LCDR B. E. Gibson, USN
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We may figure a lot, but we don't lie. That $2.46 comes from a study, "Comparison of Urban Travel Economic Costs," Highway Users Federation, 1973, which was cited in our article. We agree that it includes fixed costs.

IT'S UP TO THE PARENTS

Over the past few years I have become very safety conscious, especially since the birth of my son. He is now 4 years old and I intend to do everything possible to see that he gets the chance to grow up. I have always used restraints on him in my cars. The type has varied with age and size.

What bothers me so much and prompted this letter is the apparent lack of concern shown by so many parents toward the safety of their children. I see it every day and it is so hard to understand. My wife and I always buckle up. We have taught our son the same and now there is no problem getting him to wear his safety restraint. It becomes habit after a while. One more point. Parents should be advised that the ordinary fold-up car seat for children will do just that in a collision. A test by Consumer's Guide showed these seats to be very dangerous.

Parents should realize that kids don't know any better. Adults do!

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Miss DRIVER

PAULA MALY

"All you DRIVER readers know how important trip planning is: Getting the car in shape, checking the maps, setting sane goals for daily mileage, and scheduling frequent rest and food stops. This year we have to add some new items to our planning list.

■ Most important is to learn all you can about the availability of gas along your route. Auto clubs are a reliable source of information.

■ Check the battery, belts and hoses carefully before you leave home. These may not be so easy to replace on the road if most gas stations are closed.

■ Allow extra time in your schedule because of the lower speed limits and because you may have to look around for gas.